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Oceanographic-Systems for Chemical, Optical, and Physical Experiments (O-SCOPE)

Tommy D. Dickey
Ocean Physics Laboratory
University of California at Santa Barbara
6487 Calle Real, Suite A
Goleta, CA 93117
phone: (805) 893-7354 fax: (805) 967-5704 email: tommy@icess.ucsb.edu

Other O-SCOPE investigators include:
Nick Bates, Bermuda Biological Station for Research (BBSR)
Robert Byrne, University of South Florida
Francisco Chavez, Monterey Bay Aquarium Research Institute (MBARI)
Richard Feely, Pacific Marine Environment Laboratory (PMEL)
Casey Moore, WET Labs, Inc.
Rik Wanninkhof, Atlantic Ocean and Meteorological Laboratory (AOML)

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LONG-TERM GOALS

The National Ocean Partnership Program (NOPP) sponsored Ocean-Systems for Chemical, Optical, and Physical Experiments (O-SCOPE) program addresses the need for next-generation, autonomous, near real-time, long-term, time-series measurements in critical regions of the world oceans. To systematically obtain high-resolution, interdisciplinary oceanic data, in analog to the Mauna Loa atmospheric CO2 time series, there is need to improve the variety, quantity, quality, and cost-effectiveness of observations using a network of strategically placed moorings. Impacts of O-SCOPE relate to the development of the proposed technologies which can be used to quantify 1) trends in biogeochemical and bio-optical variables and 2) seasonal, interannual, and decadal changes in upper ocean biogeochemical and bio-optical variability and carbon fluxes. The O-SCOPE interdisciplinary sensor suites (e.g., pCO2 sensors, nitrate analyzers, and spectral optical sensors) will be tested on testbed moorings near Bermuda and Monterey Bay. The newly developed systems will also be placed on the new NOPP mooring located at Ocean Weather Station "P" in the North Pacific.

SCIENTIFIC OBJECTIVES

Scientific objectives related to the development of the proposed technologies include:
* Quantification of 1) trends in biogeochemical and bio-optical variables which could be caused by major changes in thermohaline circulation and 2) seasonal, interannual, and decadal changes in upper ocean biogeochemical and bio-optical variability and carbon fluxes.
* Monitoring trends in "ocean health" in the form of chemical, biological, and optical indicators.

APPROACH

Strategically located moorings can be envisioned as a continuous early warning system to global change in the ocean. It is our intent to capitalize on recent technological advances. Our project can accelerate the implementation of a plan to instrument (i.e., network) critical regions of the ocean with long-term interdisciplinary moorings. This plan will include optimal sampling strategies. For example, we will utilize subsampling of testbed mooring data in optical spectral bands and in time to design next-generation systems to maximize information return and minimize costs and complexity. It will be necessary to extrapolate mooring time series using remote sensing and models. Thus, we will also develop an integrated system of near real-time data distribution to the oceanographic community (for education as well as research) via the INTERNET. We will capitalize on two ongoing testbed mooring programs (near Bermuda and Monterey Bay), transitioning next generation technologies to the recently funded NOPP mooring located at Ocean Weather Station "P" in the Pacific. The O-SCOPE project will allow us to apply our partnership's expertise to develop, test, and transition requisite next-generation technologies to the oceanographic community (e.g., national agencies such as ONR, NOAA, NSF, NASA) for long-term monitoring and research of biogeochemical as well as physical processes.

WORK COMPLETED

The O-SCOPE project was only recently initiated. The first workshop for O-SCOPE investigators and collaborators was held September 14 and 15, 1998 at the Pacific Marine Environmental Laboratory (PMEL) in Seattle. The planning meeting was used to: 1) refine selection of key variables to be measured, determine capabilities and limitations of available sensors, and define specifications of next-generation sensors and systems, 2) summarize tasks of individual partners, and 3) discuss complementary activities and technical issues relevant to the test sites (Bermuda Testbed Mooring, BTM, MBARI moorings, and NOPP Ocean Station "P" mooring).

RESULTS

The project has just begun, so no results have been obtained at this point.

IMPACT/APPLICATION

The O-SCOPE activity will accelerate capabilities in measuring high frequency chemical, optical, and physical variability in remote oceanic regions for long time periods. Long-term as well as episodic and periodic changes in the ocean will be better resolved using the new O-SCOPE technologies.

TRANSITIONS

The results of our work (see impacts above) should be of interest to several levels of Navy interest.

RELATED PROJECTS

Our study is highly complementary to other activities including the Bermuda Tesbed Mooring program, the MBARI mooring program, the NOPP Ocean Station "P" mooring program, and upcoming ONR programs including HyCODE.